

EC-11 COMPOST

1.0 Compost

1.1 Description

This specification covers compost produced from various organic by-products, for use as an infill material for sediment tubes, as compost mulch, and as a soil amendment for temporary and permanent seeding applications.

Compost is the product resulting from the controlled biological decomposition of organic material occurring under aerobic conditions that has been sanitized through the generation of heat and stabilized to the point that it is appropriate for its particular application. Active composting is typically characterized by a high-temperature phase that sanitizes the product and allows a high rate of decomposition, followed by a lower-temperature phase that allows the product to stabilize while still decomposing at a slower rate. Ensure Compost possess no objectionable odors or substances toxic to plants and does not resemble the raw material from which it was derived.

1.2 Materials

Provide compost only from a compost producer that participates in the United States Composting Council's (USCC) Seal of Testing Assurance (STA) program. The Department will accept only STA approved compost.

Provide compost produced by aerobic (biological) decomposition of organic matter meeting the requirements of Table 1 (Sediment Tube Compost Media Parameters) or Table 2 (Compost Mulch and Compost Soil Amendment Parameters). Compost feedstock may include, but is not limited to, the following:

- Leaf and yard trimmings
- Food scraps
- Treated biosolids
- Manure
- Agricultural residuals
- Forest residuals
- Tree wood
- Bark
- Paper

Ensure compost does not contain any visible refuse, other physical contaminants, or any substance considered harmful to plant growth. Do not use materials that have been treated with chemical preservatives as a compost feedstock.

Proper thermophilic composting meeting the US Environmental Protection Agency's definition for a 'process to further reduce pathogens' (PFRP) will effectively reduce populations of human and plant pathogens, as well as destroy noxious weed seeds and propagules.

1.2.1 Sediment Tubes

Use compost in accordance with AASHTO specification MP 9-03 (*Filter Socks*) and compost that meets all applicable EPA 40 CFR 503 standards for Class A biosolids including the time and temperature standards. Only use compost that meets the requirements of the United States Composting Council (USCC) Seal of Testing Assurance (STA) program.

Compost sediment tubes are applicable in areas that have concentrated flow drainage patterns.

Table 1: Sediment Tube Compost Media Parameters

Parameters ^{1,4}	Reported as (units of measure)	Filter Sock Media
pH ²		5.0 – 8.5
Soluble Salt Concentration ² (electrical conductivity)	dS/m (mmhos/cm)	N/A
Moisture Content	%, wet weight basis	<60
Organic Matter Content	%, dry weight basis	20 – 100
Particle Size	% passing a selected mesh size, dry weight basis	<ul style="list-style-type: none"> 2", 90% passing 3/8", 30% to 50% passing (or 50% -70% retained) 2" maximum particle length
Stability ³ Carbon Dioxide Evolution Rate	mg CO ₂ -C per g OM per day	N/A
Physical Contaminants (man-made inerts)	%, dry weight basis	<1

¹ Recommended test methodologies are provided in Test Methods for the Examination of Composting and Compost (TMECC, The US Composting Council).

² Each specific plant species requires a specific pH range. Each plant also has a salinity tolerance rating; maximum tolerable quantities are known. When specifying the establishment of any plant or turf species, it is important to understand the pH and soluble salt requirements and how they relate to the compost in use.

³ Stability/Maturity rating is an area of compost science that is still evolving and, as such, other various test methods could be considered. Also, never base compost quality conclusions on the result of a single stability/maturity test.

⁴ Landscape architects and project engineers may modify the allowable compost specification ranges based on specific field conditions and plant requirements.

1.2.2 Compost Mulch

Use compost mulch on slopes up to a 2H:1V grade and a maximum continuous slope length of 50 feet. Use compost on areas that only have sheet flow drainage patterns. Do not use compost as mulch on areas that receive concentrated flows.

Use compost mulch in accordance with AASHTO specification MP 10-03 (*Compost Blankets*) and compost that meets all applicable EPA 40 CFR 503 standards for Class A biosolids including the time and temperature standards. Only use compost that meets the requirements of the United States Composting Council (USCC) Seal of Testing Assurance (STA) program.

1.2.3 Compost Soil Amendment

Use compost as a soil amendment on slopes up to a 2H:1V grade. Use compost on areas that only have sheet flow drainage patterns. Do not use compost on areas that receive concentrated flows.

Use compost in accordance with AASHTO specification MP 10-03 (*Compost Blankets*) and compost that meets all applicable EPA 40 CFR 503 standards for Class A biosolids including the time and temperature standards. Only use compost that meets the requirements of the United States Composting Council (USCC) Seal of Testing Assurance (STA) program.

Table 2: Compost Mulch and Compost Soil Amendment

Parameters ^{1,4}	Reported as (units of measure)	Vegetated Compost	Un-vegetated Compost
pH ²		5.0 - 8.5	N/A
Soluble Salt Concentration ² (electrical conductivity)	dS/m (mmhos/cm)	Maximum 5	Maximum 5
Moisture Content	%, wet weight basis	30 – 60	30 – 60
Organic Matter Content	%, dry weight basis	25 – 65	25-100
Particle Size	% passing a selected mesh size, dry weight basis	<ul style="list-style-type: none"> • 3", 100% passing • 1", 90% to 100% passing • 3/4", 65% to 100% passing • 1/4", 0% to 75% passing • 6" maximum particle length 	<ul style="list-style-type: none"> • 3", 100% passing • 1", 90% to 100% passing • 3/4", 65% to 100% passing • 1/4", 0% to 75% passing • 6" maximum particle length
Stability ³ Carbon Dioxide Evolution Rate	mg CO ₂ -C per g OM per day	< 8	N/A
Physical Contaminants (man-made inerts)	%, dry weight basis	< 1	< 1

¹ Recommended test methodologies are provided in Test Methods for the Examination of Composting and Compost (TMECC, The US Composting Council)

² Each specific plant species requires a specific pH range. Each plant also has a salinity tolerance rating; maximum tolerable quantities are known. When specifying the establishment of any plant or turf species, it is important to understand the pH and soluble salt requirements and how they relate to the compost in use.

³ Stability/Maturity rating is an area of compost science that is still evolving and, as such, other various test methods could be considered. Also, never base compost quality conclusions on the result of a single stability/maturity test.

⁴ Landscape architects and project engineers may modify the allowable compost specification ranges based on specific field conditions and plant requirements.

1.2.4 Quality Assurance

Only use compost products that are certified to specified product parameters in accordance with the U.S. Composting Council (USCC) Seal of Testing Assurance (STA) Program.

1.2.5 Quality Control

Before delivery of the compost, provide quality control (QC) documentation that includes the following:

- The feedstock by percentage in the final compost product.
- A statement that the compost meets federal and state health and safety regulations.
- A statement that the composting process has met time and temperature requirements.
- A copy of the lab analysis verifying that the compost meets the material requirements of this specification.

Test methods used for purposes of this specification are as provided in the Test Methods for the Examination of Compost and Composting (TMECC), jointly published by the USDA and USCC (2002 publishing as part of the USDA National Resource Conservation Technical Bulletin Series). A list of such methods is provided in the table below and on line at <http://tmecc.org/tmecc/>.

Table 3: Test Methods for Compost Characterization

Compost Parameters	Reported as	Test Method	Test Method Name
pH		TMECC 04.11-A	Electrometric pH Determinations for Compost. 1:5 Slurry Method
Soluble salts	dS/m (mmhos/cm)	TMECC 04.10-A	Electrical Conductivity for Compost. 1:5 Slurry Method (Mass Basis)
Primary plant nutrients:	%, as-is (wet) & dry weight basis		
Nitrogen	Total N	TMECC 04.02-D	Nitrogen. Total Nitrogen by Combustion
Phosphorus	P ₂ O ₅	TMECC 04.03-A	Phosphorus. Total Phosphorus
Potassium	K ₂ O	TMECC 04.04-A	Potassium. Total Potassium
Calcium	Ca	TMECC 04.04-Ca	Secondary and Micro-Nutrient Content. Calcium
Magnesium	Mg	TMECC 04.04-Mg	Secondary and Micro-Nutrient Content. Magnesium
Moisture content	%, wet weight basis	TMECC 03.09-A	Total Solids and Moisture at 70±5°C
Organic matter content	%, dry weight basis	TMECC 05.07-A	Matter Method. Loss On Ignition Organic Matter Method
Particle size	Screen size passing through	TMECC 02.12-B	Laboratory Sample Preparation. Sample Sieving for Aggregate Size Classification.
Stability (respirometry)	mg CO ₂ -C per g TS per day mg CO ₂ -C per g OM per day	TMECC 05.08-B	Respirometry. Carbon Dioxide Evolution Rate
Maturity (Bioassay) Percent Emergence Relative Seedling Vigor	% (average) % (average)	TMECC 05.05-A	Biological Assays. Seedling Emergence and Relative Growth

Perform all sampling, testing, packing, and marking of compost samples in accordance with TMECC 02.01-B (Selection of Sampling Locations for Windrows and Piles).

1.3 Construction Requirements

1.3.1 Site Preparation and Installation

1.3.1.1 Sediment Tubes

Refer to the *Sediment Tube Specification*.

1.3.1.2 Compost Mulch

Avoid very coarse compost with particles larger than 3 inches if the slope is to be landscaped or seeded, as it will make planting and vegetation establishment more difficult.

Ensure that the areas to receive compost are uniform and conform to the finished grade and cross-section shown on the Plans or as otherwise directed by the Engineer. Slightly roughen (scarify) slopes and remove large clods, rocks, stumps, roots larger than two (2) inches in diameter and debris on slopes where vegetation is to be established. Where it is practical, track (compact) perpendicular to contours on the slope using a bulldozer before applying the compost.

Place no more than a two (2) inch depth and no less than a one (1) inch depth of compost for areas that will receive seeding, planting, or landscaping as shown on the Plans. Modify compost application rates based on specific site conditions including soil characteristics, severity of slope grade, and slope length.

Uniformly apply compost using an approved spreader unit, including bulldozers, side discharge manure spreaders, etc. Alternatively, apply compost using a pneumatic (blower) unit or other unit that propels the product directly at the soil surface, thereby preventing water from moving between the soil-compost interface. Where applicable, apply the compost layer a minimum of three (3) feet over the top of the slope.

On highly unstable soils, use compost in conjunction with appropriate structural measures.

Perform a soil analysis on the compost mulch and perform temporary cover by seeding or permanent cover in accordance with the current *Seeding Specification*.

Incorporate seed directly with the compost when using a pneumatic unit. Apply the seed and compost mixture using a pneumatic blower device equipped with a calibrated seed injection system capable of uniformly and simultaneously applying compost and seed. Ensure the pneumatic blower is properly calibrated to provide the specified amounts of seed from the seeding plan. An alternative seeding application includes blending seed into the compost evenly prior to pneumatic compost application.

When not incorporating seed directly into the compost, perform temporary cover by seeding or permanent cover using hydraulic methods for seed application utilizing a HECF Type 1 as a tracer at a minimum rate of 1000 pounds/acre. Payment for the application of HECF Type 1 as a tracer is a separate bid item.

1.3.1.3 Compost Soil Amendment

Avoid very coarse compost for landscape or seeding applications as it will make planting and vegetation establishment more difficult.

Ensure that the areas to receive compost are uniform and conform to the finished grade and cross-section shown on the Plans or as otherwise directed by the *ENGINEER*. Perform minor shaping and evening of uneven and rough areas outside of graded sections as directed by the *ENGINEER* in order to provide for more effective erosion control and for ease of subsequent mowing operations.

Loosen the seedbed (including cut slopes) to a minimum depth of three (3) inches before compost is applied. Remove stones larger than two and one-half (2½) inches in any dimension, large clods, roots, or other debris brought to the surface.

Place a two (2) to three (3) inch depth of compost for areas that will receive seeding, planting, or landscaping as shown on the plans. Modify compost application rates based on specific site conditions including soil characteristics as a result of a soil test, severity of slope grade, and slope length.

Uniformly apply compost using an approved spreader unit, including bulldozers, side discharge manure spreaders, etc. Alternatively, apply compost using a pneumatic (blower) unit or other unit that propels the product directly at the soil surface.

Mix the applied compost into the soil to a minimum depth of 3 inches. Ensure that the compost is uniformly distributed within the soil and that no soil/compost interface exists.

Perform a soil analysis on the compost amended soil and perform temporary cover by seeding or permanent cover in accordance with the current *Seeding Specification*.

1.3.2 Inspection and Maintenance

1.3.2.1 Sediment Tubes

Refer to the current *Sediment Tube Specification*.

1.3.2.2 Compost Mulch

Inspect compost installation for erosion or failure every seven (7) calendar days and inspections are recommended within 24-hours after each rainfall event that produces ½-inches or more of precipitation until final stabilization is achieved.

Inspect regularly until grass or vegetation is firmly established.

Repair all damaged areas immediately by restoring the compost to its finished grade, re-apply fertilizer, seed, and replace the appropriate compost mulch material as needed.

1.3.2.3 Compost Soil Amendment

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Repair all damaged areas immediately by restoring the compost to its finished grade, re-apply fertilizer, seed, and replace the appropriate compost amendment material as needed.

1.3.3 Acceptance

Obtain *ENGINEER* acceptance and approval for all compost installations.

1.4 References

ASTM Standards:

- D 2977, Standard Test Method for Particle Size Range of Peat Materials for Horticultural Purposes.

US EPA Test Methods:

- US EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. SW-846. 3rd Edition.

TMECC Sampling and Test Methods

- Test Methods for the Examination of Compost and Composting (TMECC), jointly published by the USDA and USCC (2002 publishing as a part of the USDA National Resource Conservation Technical Bulletin Series).

Other Standards:

- US Composting Council Seal of Testing Assurance Program documents

Development of Landscape Architecture Specifications for Compost Utilization, the U.S. Composting Council, and the Clean Washington Center, 1997.

*These Specifications contain all the technical text found in the 'Official' American Association of State Highway & Transportation Officials (AASHTO) versions found in their 2003 AASHTO Provisional Standards manual. The Compost for Erosion/Sediment Control 'Filter Socks' is designated as specification MP 9-03, and the 'Compost Blankets' as specification MP 10-03. For a copy of the official AASHTO Specifications, contact AASHTO's Publications and Communications Technical Assistant at 202-624-5800.